C2X-HE

High Efficiency Condensing Economizer

Boiler Book
10/2017

The C2X-HE is a two-stage high efficiency economizer with inlet and outlet stages for feedwater and makeup or process water.

In a typical application the first stage of the C2X-HE would be used to further heat the feedwater coming from the deaerator prior to going into the boiler. The second stage would be used to preheat cold makeup water before it goes to the deaerator, or for heating process water.

FEATURES AND BENEFITS

- **New exclusive technology provides maximum heat recovery**
  Efficiencies up to 94% can be achieved depending on boiler firing rate, makeup or process flow and temperature. Cleaver-Brooks is the first in the industry to achieve such performance.
- **Available for 100-800 HP boilers**
- **Ideal for high-percentage makeup water or separate hot water applications**
  Optimal performance in food processing and laundry applications.
- **First-stage economizer provides excellent performance**
  304 stainless steel tubes with aluminized steel-fin material.
- **Second-stage condensing**
  304 Stainless Steel tubes with aluminum fin material.
- **Compact and light-weight design**
- **Heat exchanger is easily accessible**
  Economizer is offset from boiler on dedicated stand.
- **ASME U-stamp certified**

PRODUCT OFFERING

Model C2X-HE economizers are available for boilers from 100 to 800 HP.

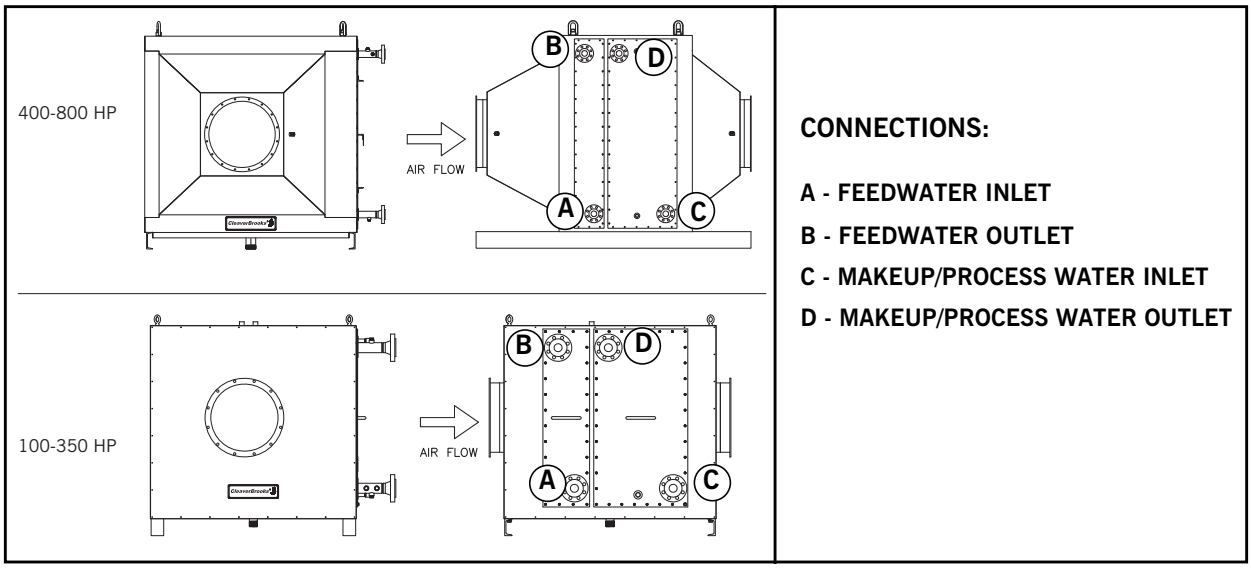

Figure 1 - C2X-HE

PERFORMANCE DATA

Economizer estimated efficiency calculations - makeup water @ 60 deg F; 80-225 psig operating pressure

			Boiler HP							
			100		125		150		200	
Water flow @ 100% makeup			6.8 GPM		8.5 GPM		10.2 GPM		13.6 GPM	
Boiler Firing Rate %	Make up flow %	Econ outlet temp deg F	Condensate lbs/hr	Efficiency %	Condensate lbs/hr	Efficiency %	Condensate lbs/hr	Efficiency %	Condensate lbs/hr	Efficiency %
100%	10	181	0	87.6%	0	87.6%	0	87.6%	0	87.6%
100%	20	154	18	88.7%	23	88.7%	27	88.7%	36	88.7%
100%	50	139	84	90.8%	105	90.8%	126	90.8%	168	90.8%
100%	100	128	186	93.7%	233	93.7%	279	93.7%	372	93.7%
100%	150	115	246	95.6%	308	95.6%	369	95.6%	492	95.6%
75%	10	163	0	87.8%	0	87.8%	0	87.8%	0	87.8%
75%	20	150	12	88.5%	15	88.5%	18	88.5%	24	88.5%
75%	50	135	60	90.6%	75	90.6%	90	90.6%	120	90.6%
75%	100	125	138	93.5%	173	93.5%	207	93.5%	276	93.5%
75%	150	109	186	95.6%	233	95.6%	279	95.6%	372	95.6%
50%	10	157	0	87.6%	0	87.6%	0	87.6%	0	87.6%
50%	20	145	12	88.5%	15	88.5%	18	88.5%	24	88.5%
50%	50	131	42	90.4%	53	90.4%	63	90.4%	84	90.4%
50%	100	121	90	93.2%	113	93.2%	135	93.2%	180	93.2%
50%	150	100	120	95.3%	150	95.3%	180	95.3%	240	95.3%
25%	10	148	0	86.8%	0	86.8%	0	86.8%	0	86.8%
25%	20	137	6	87.7%	8	87.7%	9	87.7%	12	87.7%
25%	50	124	18	89.3%	23	89.3%	27	89.3%	36	89.3%
25%	100	114	48	92.7%	60	92.7%	72	92.7%	96	92.7%
25%	150	77	60	94.8%	75	94.8%	90	94.8%	120	94.8%

Estimated efficiencies continued

			Boiler HP							
			250		300		350		400	
Water flow @ 100% makeup			17 GPM		20.4 GPM		23.8 GPM		27.2 GPM	
Boiler Firing Rate %	Make up flow %	Econ outlet temp deg F	Condensate lbs/hr	Efficiency %	Condensate lbs/hr	Efficiency %	Condensate lbs/hr	Efficiency %	Condensate lbs/hr	Efficiency %
100%	10	181	0	87.6%	0	87.6%	0	87.6%	0	87.8%
100%	20	154	45	88.7%	54	88.7%	63	88.7%	72	88.9%
100%	50	139	210	90.8%	252	90.8%	294	90.8%	336	91.0%
100%	100	128	465	93.7%	558	93.7%	651	93.7%	744	93.9%
100%	150	115	615	95.6%	738	95.6%	861	95.6%	984	95.8%
75%	10	163	0	87.8%	0	87.8%	0	87.8%	0	88.1%
75%	20	150	30	88.5%	36	88.5%	42	88.5%	48	88.8%
75%	50	135	150	90.6%	180	90.6%	210	90.6%	240	90.8%
75%	100	125	345	93.5%	414	93.5%	483	93.5%	552	93.8%
75%	150	109	465	95.6%	558	95.6%	651	95.6%	744	95.9%
50%	10	157	0	87.6%	0	87.6%	0	87.6%	0	88.0%
50%	20	145	30	88.5%	36	88.5%	42	88.5%	48	88.9%
50%	50	131	105	90.4%	126	90.4%	147	90.4%	168	90.8%
50%	100	121	225	93.2%	270	93.2%	315	93.2%	360	93.6%
50%	150	100	300	95.3%	360	95.3%	420	95.3%	480	95.7%
25%	10	148	0	86.8%	0	86.8%	0	86.8%	0	87.6%
25%	20	137	15	87.7%	18	87.7%	21	87.7%	24	88.5%
25%	50	124	45	89.3%	54	89.3%	63	89.3%	72	90.1%
25%	100	114	120	92.7%	144	92.7%	168	92.7%	192	93.5%
25%	150	77	150	94.8%	180	94.8%	210	94.8%	240	95.6%

Estimated efficiencies continued

			Boiler HP							
			500		600		700		800	
Water flow @ 100% makeup			34 GPM		40.8 GPM		47.6 GPM		54.4 GPM	
Boiler Firing Rate %	Make up flow %	Econ outlet temp deg F	Condensate lbs/hr	Efficiency %	Condensate lbs/hr	Efficiency %	Condensate lbs/hr	Efficiency %	Condensate lbs/hr	Efficiency %
100%	10	181	0	87.8%	0	87.8%	0	87.8%	0	87.8%
100%	20	154	90	88.9%	108	88.9%	126	88.9%	144	88.9%
100%	50	139	420	91.0%	504	91.0%	588	91.0%	672	91.0%
100%	100	128	930	93.9%	1116	93.9%	1302	93.9%	1488	93.9%
100%	150	115	1230	95.8%	1476	95.8%	1722	95.8%	1968	95.8%
75%	10	163	0	88.1%	0	88.1%	0	88.1%	0	88.1%
75%	20	150	60	88.8%	72	88.8%	84	88.8%	96	88.8%
75%	50	135	300	90.8%	360	90.8%	420	90.8%	480	90.8%
75%	100	125	690	93.8%	828	93.8%	966	93.8%	1104	93.8%
75%	150	109	930	95.9%	1116	95.9%	1302	95.9%	1488	95.9%
50%	10	157	0	88.0%	0	88.0%	0	88.0%	0	88.0%
50%	20	145	60	88.9%	72	88.9%	84	88.9%	96	88.9%
50%	50	131	210	90.8%	252	90.8%	294	90.8%	336	90.8%
50%	100	121	450	93.6%	540	93.6%	630	93.6%	720	93.6%
50%	150	100	600	95.7%	720	95.7%	840	95.7%	960	95.7%
25%	10	148	0	87.6%	0	87.6%	0	87.6%	0	87.6%
25%	20	137	30	88.5%	36	88.5%	42	88.5%	48	88.5%
25%	50	124	90	90.1%	108	90.1%	126	90.1%	144	90.1%
25%	100	114	240	93.5%	288	93.5%	336	93.5%	384	93.5%
25%	150	77	300	95.6%	360	95.6%	420	95.6%	480	95.6%

ENGINEERING DATA

The economizer is designed for stand mounting in the horizontal position, or in an equivalent orientation with support by others.

Flanged connections are provided for makeup water and feedwater.

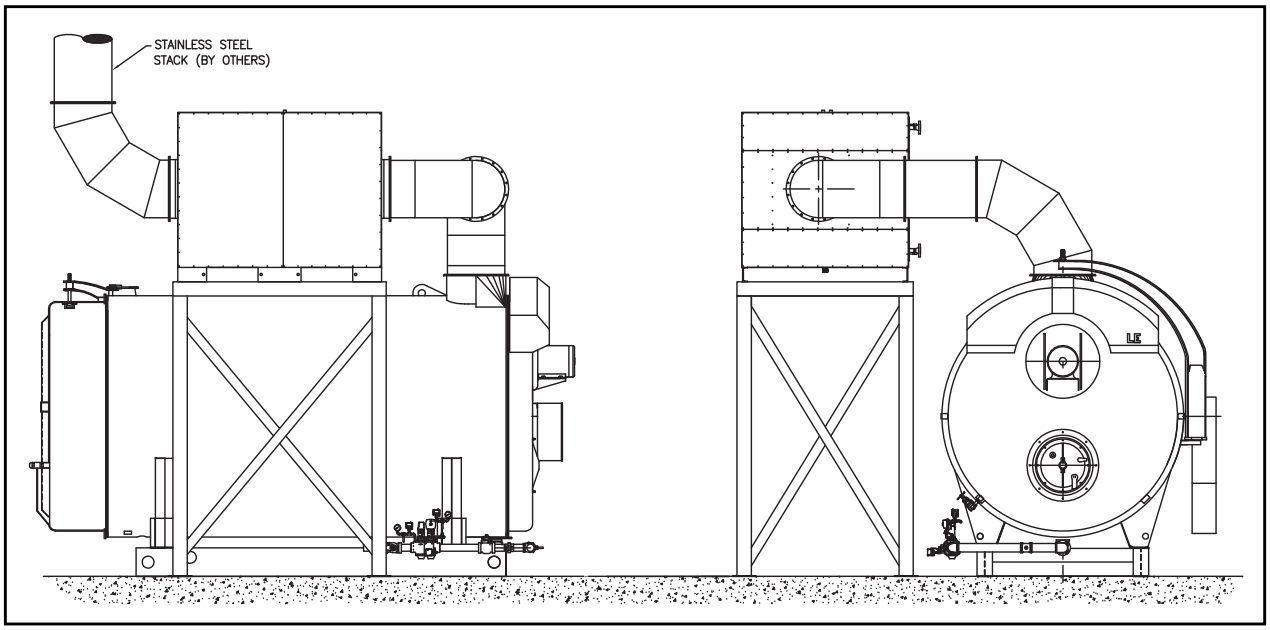

Figure 2 - Installation, typical

Some typical system schematics are shown in the pages that follow; for operational descriptions see the economizer O&M manual.

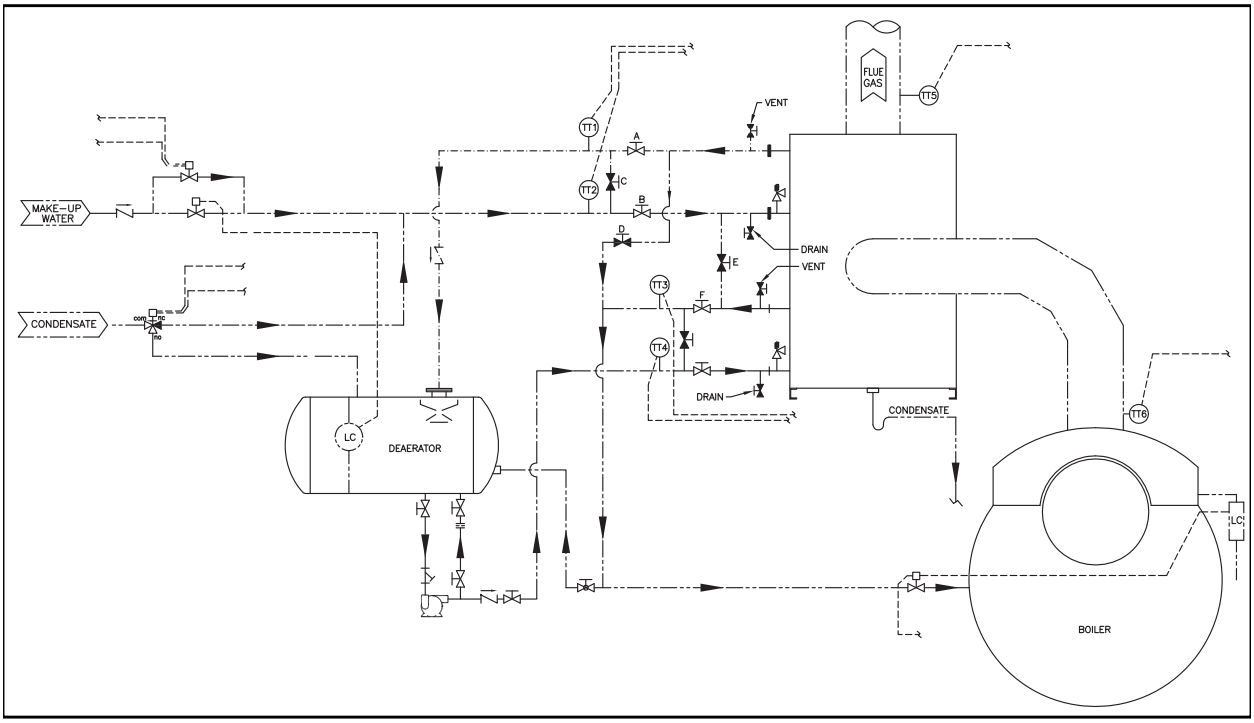

Figure 3 - Typical system piping: single boiler and deaerator

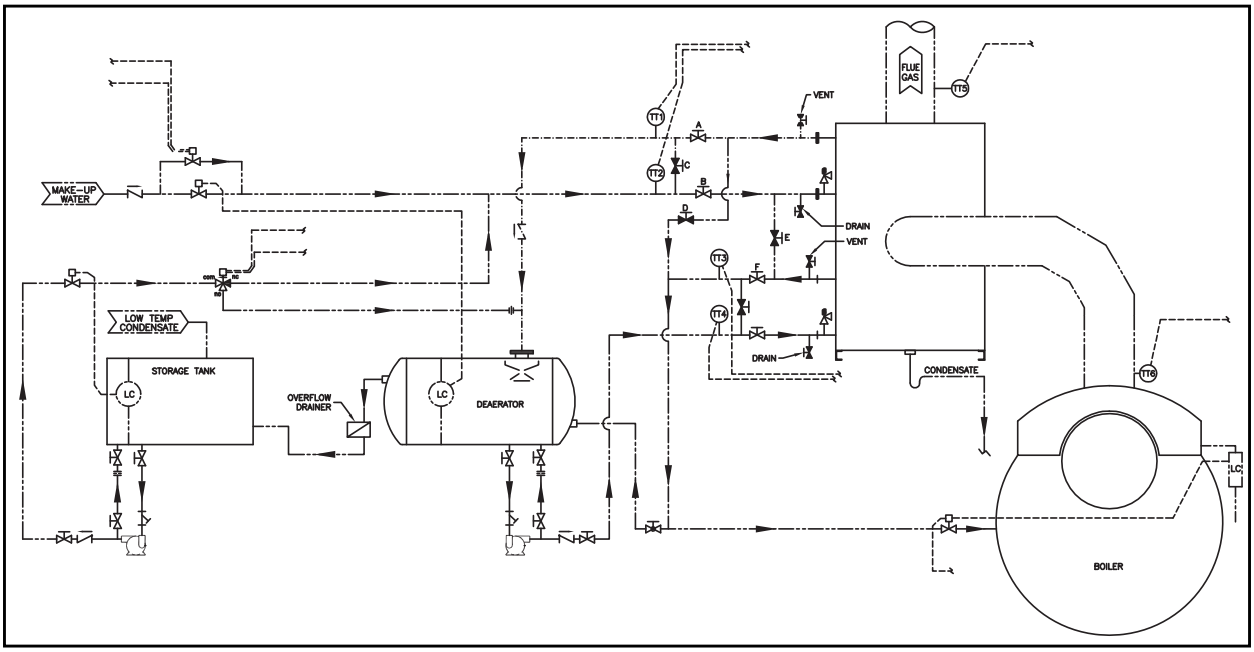

Figure 4 - Typical system piping: single boiler, deaerator, and surge tank

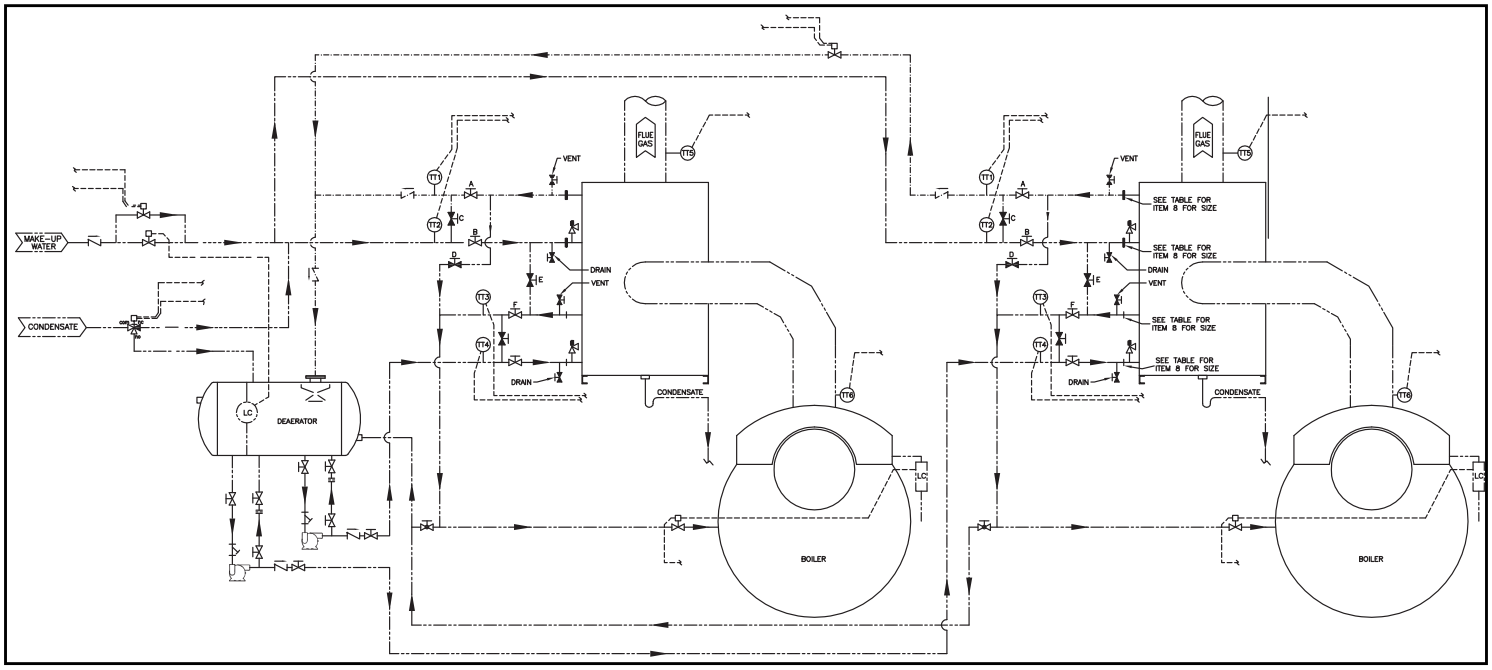

Figure 5 - Typical system piping: two boilers and deaerator

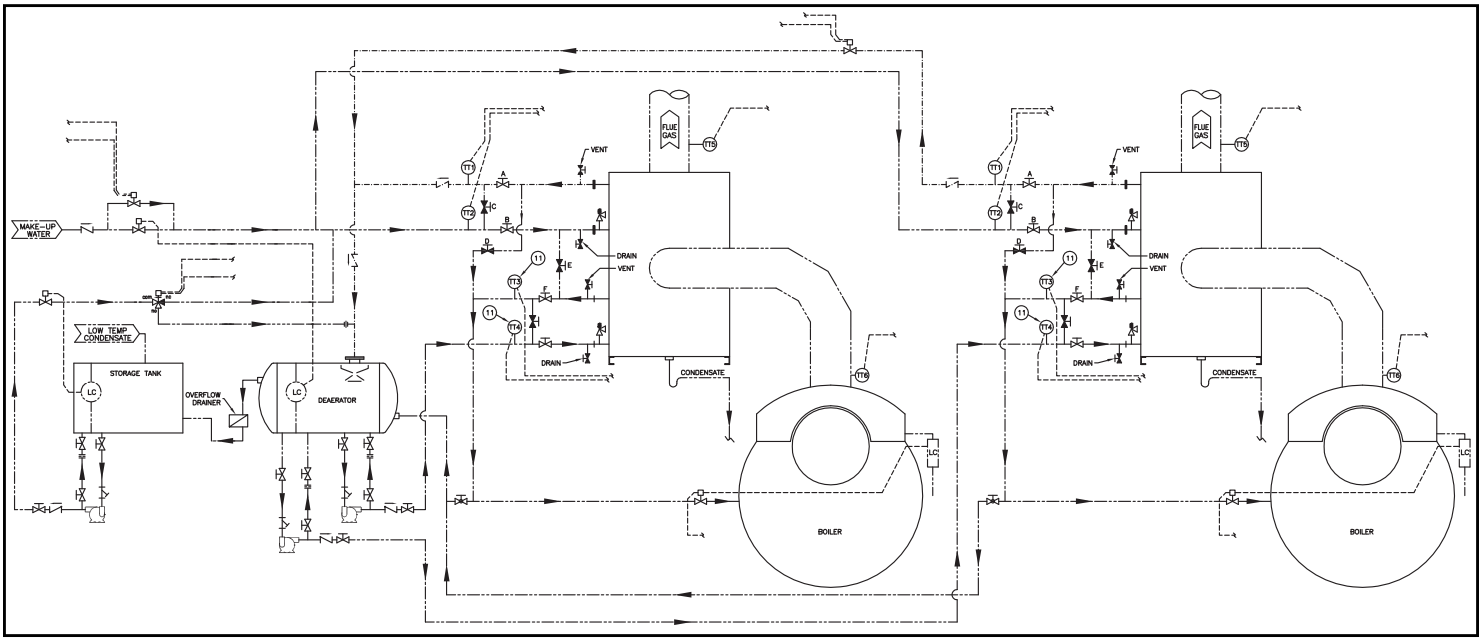

Figure 6 - Typical system piping: two boilers, deaerator, and surge tank

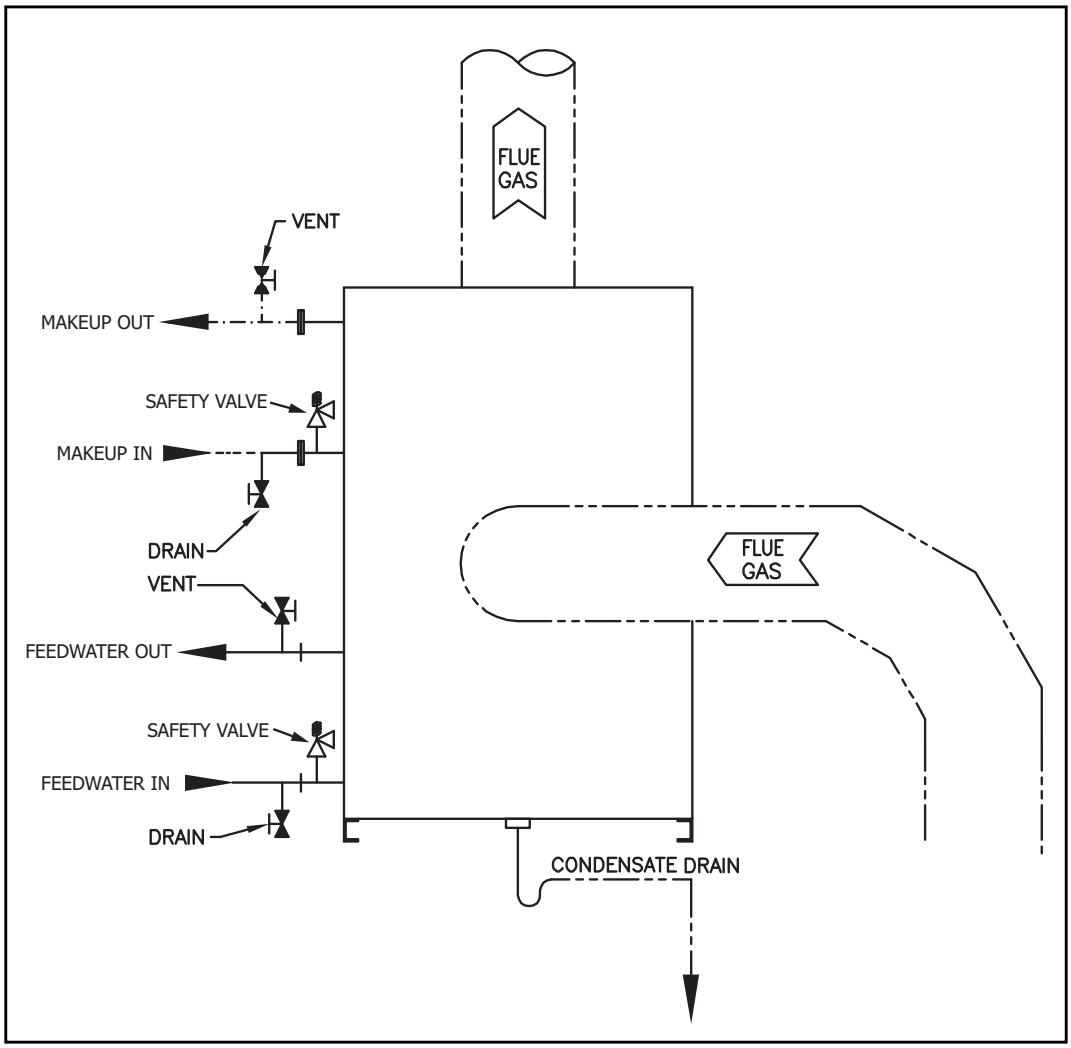

Figure 7 - Economizer piping detail